1.0 Introduction

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This Hanford Site environmental report is produced through the joint efforts of the principal site contractors (Pacific Northwest National Laboratory, Fluor Hanford, Inc. and its subcontractors, Bechtel Hanford, Inc. and its subcontractors, CH2M HILL Hanford Group, Inc., and MACTEC-ERS). This report, published annually since 1958, includes information and summary data that 1) characterize environmental management performance at the Hanford Site; 2) demonstrate the status of the site's compliance with applicable federal, state, and local environmental laws and regulations; and 3) highlight significant environmental monitoring and surveillance programs and projects.

Specifically, this report provides a short introduction to the Hanford Site and its history; discusses the site mission; and briefly highlights the site's various waste management, waste remediation, environmental restoration, effluent monitoring, environmental surveillance, and environmental compliance programs and projects. Included are summary data and descriptions for the Hanford Site Groundwater/Vadose Zone Integration Project, the Environmental Restoration Project, the Near-Facility Environmental Monitoring Program, the Integrated Biological Control Program, the Surface Environmental Surveillance Project, the Hanford Groundwater Monitoring Project, the Hanford Cultural Resources Laboratory, wildlife studies, climate and meteorological monitoring, and information about other programs and projects. Also included are sections discussing environmental occurrences, current issues and actions, environmental cleanup and restoration activities, compliance issues, and descriptions of major operations and activities. Readers interested in more detail than that provided in this report should consult the technical documents cited in the text and listed in the reference sections. Descriptions of specific analytical and sampling methods used in the monitoring efforts are contained in the Hanford Site environmental monitoring plan (DOE/RL-91-50, Rev. 2).

1.0.1 Overview of the Hanford Site

The Hanford Site lies within the semiarid Pasco Basin of the Columbia Plateau in southeastern Washington State (Figure 1.0.1). The site occupies an area of ~1,517 square kilometers (~586 square miles) (68 square kilometers [26 square miles] larger this year to include U.S. Department of Energy [DOE]-owned portions of the Columbia River) located north of the city of Richland and the confluence of the Yakima and Columbia Rivers (DOE/EIS-0222). This large area has restricted public access and provides a buffer for the smaller areas on the site that historically were used for production of nuclear materials, waste storage, and waste disposal. Only ~6% of the land area has been disturbed and actively used. The Columbia River flows eastward through the northern part of the Hanford Site and then turns south, forming part of the eastern site boundary. The Yakima River flows near a portion of the southern boundary and joins the Columbia River at the city of Richland. Portions of the site are managed by the U.S. Fish and Wildlife Service as part of the Arid Lands National Wildlife refuge complex.

The Hanford Site is the largest single source of employment in the Tri-Cities. However, the number of employees at Hanford is down considerably from a

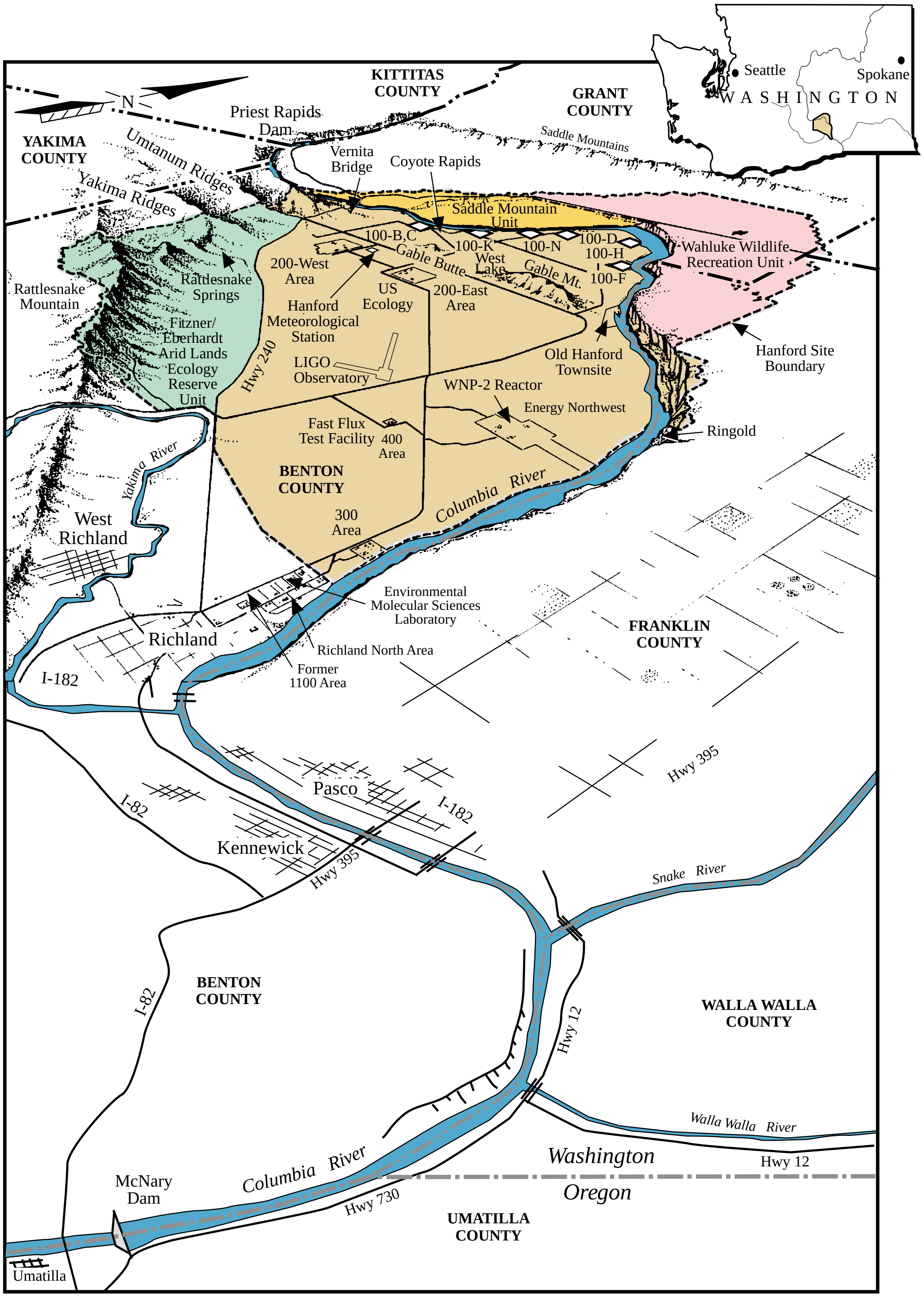

Figure 1.0.1. The Hanford Site and Surrounding Area

peak of 19,200 in fiscal year 1994. DOE employed 10,400 federal and contractor employees in fiscal year 1999. Hanford's large portion of the Tri-Cities' employment has affected other areas of employment, directly or indirectly accounting for 32% of all jobs in the Tri-Cities (DOE/RL-2000-32). The five largest non-Hanford Site employers employed ~5,115 people in Benton and Franklin Counties in 1999.

Estimates for 1999 placed population totals for Benton and Franklin Counties at 138,900 and 45,100, respectively (Washington State Office of Financial Management 1999). When compared to the 1990 census data (U.S. Bureau of the Census 1994) in which Benton County had 112,560 individuals and Franklin County had 37,473 individuals, the population totals reflect continued growth. The populations in Benton and Franklin Counties increased by 1,400 and 700, respectively, in 1999.

The 1999 estimates distributed the Tri-Cities' population within each city as follows: Richland 36,880, Pasco 26,600, and Kennewick 50,950. The combined populations of Benton City, Prosser, and West Richland totaled 14,700 in 1999. The unincorporated population of Benton County was 36,370. In Franklin County, incorporated areas (cities and towns) other than Pasco have a total population of 3,470. The unincorporated rural population of Franklin County was 15,030 (Washington State Office of Financial Management 1999).

The 1999 estimates of racial/ethnic distribution (Washington State Office of Financial Management 1999) indicate that Asians represent a lower proportion and individuals of Hispanic origin represent a higher proportion of the population in Benton and Franklin Counties than those in Washington State. At the time of the 1990 census (U.S. Bureau of Census 1994), Hispanics accounted for nearly 81% of the minority population around the Hanford Site. The site is also surrounded by a relatively large percentage (~9%) of Native Americans.

Benton and Franklin Counties account for 3.2% of Washington State's population (Washington State Office of Financial Management 1998). In 1999, the population demographics of Benton and Franklin Counties were similar to those found within Washington State. The population in Benton and Franklin Counties under the age of 35 was 53.1%, compared to 49.3% for the state. In general, the population of Benton and Franklin Counties was somewhat younger than that of the state. The 0- to 14-year-old age group accounted for 26.2% of the total bicounty population, compared to 22.3% for the state. In 1999, the 65-year-old and older age group constituted 9.6% of the population of Benton and Franklin Counties, compared to 11.4% for the state.

1.0.1.1 Site Description

The entire Hanford Site was designated a National Environmental Research Park (one of four nationally) by the former U.S. Energy Research and Development Administration, a precursor to the DOE.

The major areas on the site (see Figure 1.0.1) include the following:

- The 100 Areas, on the south shore of the Columbia River, are the sites of nine retired plutonium production reactors, including the dual-purpose N Reactor. The 100 Areas occupy ~11 square kilometers (4 square miles).
- The 200-West and 200-East Areas are located on a plateau and are ~8 and 11 kilometers (5 and 7 miles), respectively, south and west of the Columbia River. The 200 Areas cover ~16 square kilometers (6 square miles).
- The 300 Area is located just north of the city of Richland. This area covers 1.5 square kilometers (0.6 square mile).
- The 400 Area is ~8 kilometers (5 miles) northwest of the 300 Area.
- The 600 Area includes all of the Hanford Site not occupied by the 100, 200, 300, and 400 Areas.

- The former 311-hectare (768-acre) 1100 Area is located generally between the 300 Area and the city of Richland and included site support services such as general stores and transportation maintenance. On October 1, 1998, this area was transferred to the Port of Benton as a part of the DOE's Richland Operations Office economic diversification efforts and is no longer part of the Hanford Site. However, DOE contractors continue to lease facilities in this area.
- The Richland North Area (off the site) includes DOE and contractor facilities, mostly leased office buildings, generally located in the northern part of the city of Richland.

Other facilities (office buildings) are located in the Richland Central Area (located south of Saint Street and Highway 240 and north of the Yakima River), the Richland South Area (located between the Yakima River and Kennewick), and the Kennewick/Pasco area.

Several areas of the site, totaling 665 square kilometers (257 square miles), have special designations. These include the Fitzner/Eberhardt Arid Lands Ecology Reserve (310 square kilometers [120 square miles]), the U.S. Fish and Wildlife Service Saddle Mountain National Wildlife Refuge (~130 square kilometers [50 square miles]), and Wahluke Wildlife Recreation Area (225 square kilometers [87 square miles]). Together, these make up the Arid Lands National Wildlife Refuge Complex. The Fitzner/Eberhardt Arid Lands Ecology Reserve was established in 1967 by the U.S. Atomic Energy Commission, a precursor to DOE, to preserve shrub-steppe habitat and vegetation. In 1971, the reserve was classified a Research Natural Area as a result of a federal interagency cooperative agreement. In June 1997, DOE transferred management of the reserve, including access management, from Pacific Northwest National Laboratory to the U.S. Fish and Wildlife Service, who will continue to operate the reserve using the in-place management policy (PNL-8506) until a new management plan can be written. This is scheduled to occur within 3 years of the June 1997 transfer date.

Since 1971, the west portion of the Wahluke Slope Area (Saddle Mountain National Wildlife Refuge) has been managed under permit by the U.S. Fish and Wildlife Service and the east and north portion (Wahluke Wildlife Recreation Area) has been managed by the Washington State Department of Fish and Wildlife. In early 1999, the Washington State Department of Fish and Wildlife withdrew from management of the Wahluke Wildlife Recreation Area. Secretary of Energy Bill Richardson announced in April 1999 the proposal to manage the entire Wahluke Slope area as a national wildlife refuge. The recreation area and the Saddle Mountain National Wildlife Refuge were renamed the Wahluke Wildlife Recreation and Saddle Mountain Units, respectively, and will be managed by the U.S. Fish and Wildlife Service. The Wahluke Slope is a prime example of a shrub-steppe habitat that is quickly disappearing in the Pacific Northwest. This land has served as a safety and security buffer zone for Hanford Site operations since 1943, resulting in an ecosystem that has been relatively untouched.

Non-DOE operations and activities on Hanford Site leased land or in leased facilities include commercial power production by Energy Northwest (Columbia Generating Station, formerly the WNP-2 reactor) (4.4 square kilometers [1.6 square miles]) and operation of a commercial low-level radioactive waste burial site by US Ecology, Inc. (0.4 square kilometer [0.2 square mile]). Kaiser Aluminum and Chemical Corporation is leasing the 313 Building in the 300 Area to use an extrusion press that was formerly DOE owned. The National Science Foundation has built the Laser Interferometer Gravitational-Wave Observatory facility near Rattlesnake Mountain for gravitational wave studies. R. H. Smith Distributing operates vehicle-fueling stations in the former 1100 Area and 200 Areas. Washington State University at Tri-Cities operates three laboratories in the 300 Area. Livingston Rebuild Center, Inc. has leased the 1171 Building, in the former 1100 Area, to rebuild train locomotives. Johnson Controls, Inc. operates 42 diesel and natural gas package boilers to produce steam in the 200 and 300 Areas (replacing the old coal-fired steam plants) and also has compressors supplying compressed air to the site. Near the city of Richland, immediately adjacent to the southern boundary of the Hanford Site, Siemens Power Corporation operates a commercial nuclear fuel fabrication facility and Allied Technology Group Corporation operates a low-level radioactive waste decontamination, super compaction, and packaging facility.

Much of the above information is from PNNL-6415, Rev. 12, where more detailed information can be found.

1.0.2 Historical Site Operations

This section addresses the historic operational mission of the Hanford Site. However, with the end of the Cold War and the advent of waste treatment and disposal technologies and environmental management, this original mission has been replaced by cleanup. Section 1.0.3, "Current Site Mission" and Section 2.3, "Activities, Accomplishments, and Issues," summarize current activities at the Hanford Site.

The Hanford Site was established in 1943 to use technology developed at the University of Chicago and the Clinton Laboratory in Oak Ridge, Tennessee, to produce plutonium for some of the nuclear weapons tested and used in World War II. Hanford was the first plutonium production facility in the world. The site was selected by the U.S. Army Corps of Engineers because it was remote from major populated areas and had 1) ample electrical power from Grand Coulee Dam, 2) a functional railroad, 3) clean water from the nearby Columbia River, and 4) sand and gravel that could be used to construct large concrete structures. For security, safety, and functional reasons, the site was divided into numbered areas (see Figure 1.0.1).

Hanford Site operations have produced liquid, solid, and gaseous wastes. Most waste resulting from site operations has had at least the potential to contain radioactive materials. From an operational standpoint, radioactive waste was originally categorized (see Table 10.3 in Fitzgerald 1970) as "high level," "intermediate level," or "low level," which referred to the level of radioactivity present. Some high-level solid waste, such as large pieces of machinery and equipment, were placed onto railroad flatcars and stored in underground tunnels. Both intermediate- and low-level solid wastes, consisting of tools, machinery, paper, or wood, were placed into covered trenches at storage and disposal sites known as "burial grounds." Beginning in 1970, solid waste was segregated according to the makeup of the waste material. Solids contaminated with plutonium and other transuranic materials were packaged in special containers and stored in trenches covered with soil for possible later retrieval. High-level liquid waste was stored in large underground tanks. Intermediate-level liquid waste streams were usually routed to underground structures of various types called "cribs." Occasionally, trenches were filled with the liquid waste and then covered with soil after the waste had soaked into the ground. Low-level liquid waste streams were usually routed to surface impoundments (ditches and ponds). Nonradioactive solid waste was usually burned in "burning grounds." This practice was discontinued in the late 1960s in response to the *Clean Air Act*, and the materials were buried at sanitary landfill sites. These storage and disposal sites, with the exception of high-level waste tanks, are now designated as "active" or "inactive" waste sites, depending on whether the site currently receives waste.

All unrestricted discharges of radioactive liquid waste to the ground were discontinued in 1997. The 616-A crib (also known as the State-Approved Land Disposal Site) receives radioactive (tritium) liquid waste from the 200 Areas Effluent Treatment Facility. This effluent is the only discharge of radioactive liquid waste to the ground at Hanford. All other liquids discharged to the ground are licensed by permit from the state of Washington. National Pollutant Discharge Elimination System permits issued by the U.S. Environmental Protection Agency (EPA) govern liquid discharges to the Columbia River (40 CFR 122). Permits from EPA, the Washington State Department of Health, and the Washington State Department of Ecology govern the discharge of gaseous effluents to the atmosphere. See Section 2.2, "Compliance Status," for details. The status of the high-level waste tanks is discussed in Section 2.3.7, "Office of River Protection."

1.0.2.1 The 300 Area

From the early 1940s until the advent of the cleanup mission, most research and development at the Hanford Site were carried out in the 300 Area, located just north of Richland. The 300 Area was also the location of nuclear fuel fabrication. Nuclear fuel in the form of pipe-like cylinders (fuel elements) was fabricated from metallic uranium shipped in from offsite production facilities. Metallic uranium was extruded into the proper shape and encapsulated in aluminum or zirconium cladding. Copper was an important material used in the extrusion process, and substantial amounts of copper, uranium, and other heavy metals ended up in 300 Area liquid waste streams. Initially, these streams were routed to the 300 Area waste ponds, which were located near the Columbia River shoreline. In more recent times, the low-level liquid waste was sent to process trenches or shipped to a solar evaporation facility in the 100-H Area (183-H solar evaporation basins). This practice has been discontinued. At this time, all liquid process waste generated in the 300 Area is treated at the 300 Area Treated Effluent Disposal Facility and released to the Columbia River according to the requirements of a National Pollutant Discharge Elimination System permit. Sewage waste is released into the city of Richland sanitary water treatment system.

Former fuel fabrication buildings and facilities are now used for other purposes or are in various stages of cleanup or restoration. For example, the 313 Building that houses a very large and unique aluminum extrusion press is leased by DOE to Kaiser Aluminum and Chemical Corporation.

1.0.2.2 The 100 Areas

The fabricated fuel elements were shipped by rail from the 300 Area to the 100 Areas. The 100 Areas are located on the Columbia River shoreline, where up to nine nuclear reactors were in operation. The main component of the nuclear reactors consisted of a large stack (pile) of graphite blocks that had tubes and pipes running through it. The tubes were receptacles for the fuel elements while the pipes carried water to cool the graphite pile. Placing large numbers of slightly radioactive uranium fuel elements into the reactor piles created an intense radiation field, and a radioactive chain reaction resulted in the conversion of some uranium atoms into plutonium atoms. Other uranium atoms were split into radioactive "fission products." The intense radiation field also caused some nonradioactive atoms in the structure to become radioactive "activation products."

The first eight reactors, constructed between 1944 and 1955, used water from the Columbia River for direct cooling. Large quantities of water were pumped through the reactor piles and discharged back into the river. The discharged cooling water contained primarily activation products from impurities in the river water made radioactive by neutron activation and radioactive materials that escaped from the fuel elements or tube walls during the irradiation process. The ninth reactor, N Reactor, was completed in 1963 and was a modified design. Purified water was recirculated through the reactor core in a closed-loop cooling system. Beginning in 1966, the heat from the closed-loop system was used to produce steam that was sold to Energy Northwest to generate electricity at the adjacent Hanford Generating Plant.

When fresh fuel elements were pushed into the front face of a reactor's graphite pile, irradiated fuel elements were forced out the rear into a deep pool of water called a "fuel storage basin." After a brief period of storage in the basin, the irradiated fuel was shipped to the 200 Areas for processing. The fuel was shipped in casks by rail in specially constructed railcars. Most of the irradiated fuel produced by the N Reactor from the early 1970s to the early 1980s was the result of electricity production runs. This material was not weapons grade, so was never processed for recovery of plutonium.

Beginning in 1975, N Reactor irradiated fuel was shipped to the K-East and K-West fuel storage basins (K basins) for temporary storage, where it remains today. This fuel accounts for the majority of the total fuel inventory stored under water in the K basins. From the early 1980s until its shutdown in 1987, N Reactor operated to produce weapons-grade material. Electricity production continued during this operating period but was actually a byproduct of the weapons production program. The majority of weapons-grade material produced during these runs was processed in the 200-East Area at the Plutonium-Uranium Extraction Plant prior to its shutdown. The remainder is stored in the K basins. See Section 2.3.3, "Spent Nuclear Fuel Project," for the status and details regarding the storage of spent fuel.

All of the Hanford production reactors and most of the associated facilities have been shut down and deactivated, and each 100 Area is in some stage of cleanup, decommissioning, or restoration. For example, C Reactor has been cocooned and placed into interim safe storage as a large-scale demonstration, a state that it can safely remain in for many years. Of the 24 facilities associated with the reactor, 23 have been removed. See Section 2.3, "Activities, Accomplishments, and Issues," for the status of various facilities.

1.0.2.3 The 200 Areas

The 200-East and 200-West Areas are located on a plateau approximately in the center of the site. These areas house facilities that received and dissolved irradiated fuel and then separated out the valuable plutonium (Figure 1.0.2). These facilities were called "separations plants." Three types of separations plants were used over the years to process irradiated fuel. Each of the plutonium production processes began with the dissolution of the aluminum or zirconium cladding material in solutions containing ammonium hydroxide/ammonium nitrate/ ammonium fluoride followed by the dissolution of the irradiated fuel elements in nitric acid. All three separations plants, therefore, produced large quantities of waste nitric acid solutions that contained high levels of radioactive materials. These wastes were neutralized and stored in large underground tanks. Fumes from the dissolution of cladding and fuel and from other plant processes were discharged to the atmosphere from tall smokestacks. Filters were added to the stacks after 1950.

Both B and T plants used a "bismuth phosphate" process to precipitate and separate plutonium from acid solutions during the early days of site operations. Leftover uranium and high-level waste products were not separated and were stored together in large, underground, single-shell tanks (i.e., tanks constructed with a single wall of steel). The leftover uranium was later salvaged, purified into uranium oxide powder at the Uranium-TriOxide Plant, and transported to uranium production facilities in other parts of the country for reuse. The salvage process used a solvent extraction technique that resulted in radioactive liquid waste that was discharged to the soil in covered trenches at the BC cribs area south of the 200-East Area.

After T Plant stopped functioning as a separations facility, it was converted to a decontamination operation, where pieces of equipment and machinery could be radiologically decontaminated for reuse. B Plant was later converted into a facility to separate radioactive strontium and cesium from high-level waste. The strontium and cesium were then concentrated into a solid salt material, melted, and encapsulated at the adjacent encapsulation facility. Canisters

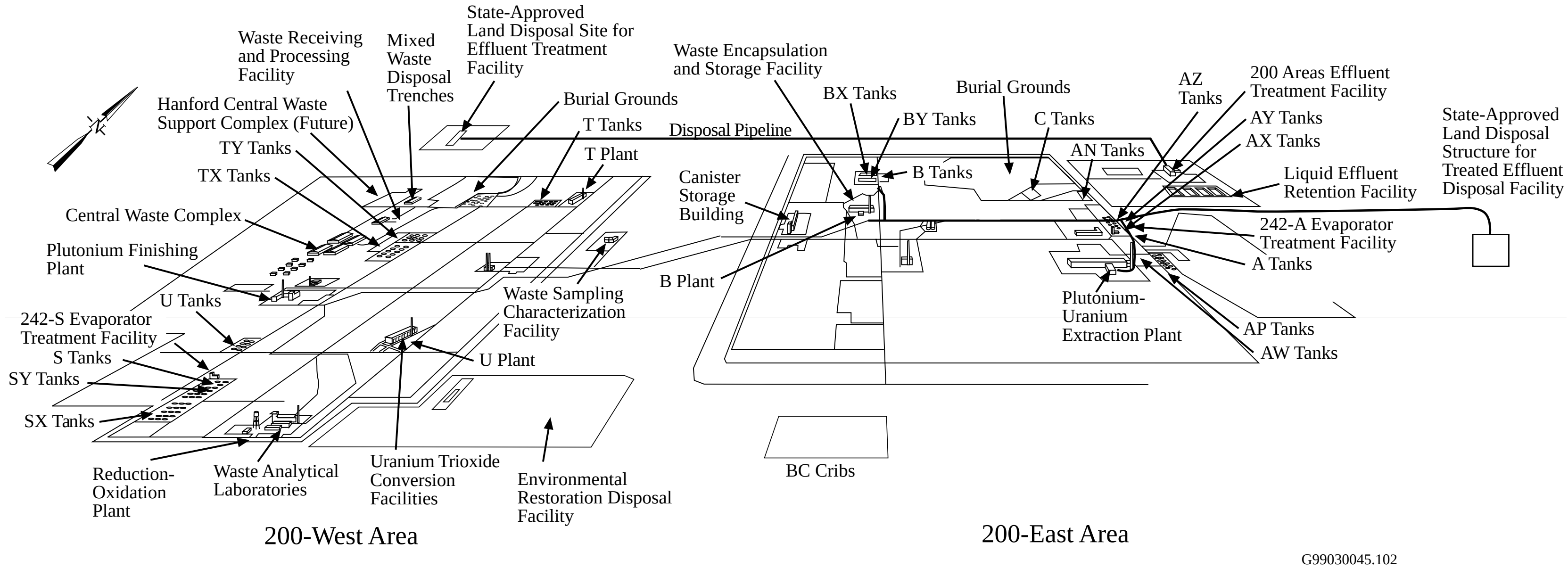

Figure 1.0.2. Waste Processing, Storage, and Disposal Facilities in the 200 Areas

of encapsulated strontium and cesium are currently stored in a water storage basin at the encapsulation facility.

In 1952, U Plant in the 200-West Area, built during World War II but not needed as a processing canyon, was retrofitted as the Metal Recovery Plant. Its mission was to use a new tributyl phosphate/ saturated kerosene extraction technique to recover uranium from the waste stored in Hanford's tank farms. The scarcity of high-grade uranium supplies made this mission crucial and much of the United States' supply of uranium was housed in Hanford's tanks. The separated uranium was purified into uranium oxide powder at the Uranium-TriOxide Plant.

The Reduction-Oxidation and Plutonium-Uranium Extraction Plants used solvent extraction techniques to separate plutonium from leftover uranium and radioactive waste products. Most of the irradiated fuel produced at the site was processed at either of these two plants. The solvent extraction method separates chemicals based on their differing solubilities in water and organic solvents (i.e., hexone at the Reduction-Oxidation Plant and tributyl-phosphate at the Plutonium-Uranium Extraction Plant). High-level liquid wastes were neutralized and stored in single-shell tanks (Reduction-Oxidation Plant) or double-shell tanks (Plutonium-Uranium Extraction Plant). Occasionally, organic materials such as solvents and resins ended up in high-level liquid waste streams sent to the tanks. Various chemicals and radioactive materials precipitated and settled to the bottom of the tanks. This phenomenon was later used to advantage. The liquid waste was heated in special facilities (evaporators) to remove excess water and concentrate the waste into salt cake and sludge, which remained in the tanks. The evaporated and condensed water contained radioactive tritium and was discharged to cribs. Intermediate- and low-level liquid wastes discharged to the soil from the Reduction-Oxidation and Plutonium-Uranium Extraction Plants typically contained tritium and other radioactive fission products as well as nonradioactive nitrate. Intermediate-level liquid wastes discharged to cribs from the Reduction-Oxidation Plant sometimes contained hexone used in the reduction-oxidation process. Cooling water from the Reduction-Oxidation Plant was discharged to the 216-S-10 pond (B Pond). Cooling water from the Plutonium-Uranium Extraction Plant was discharged to the Gable Mountain and 216-B-3 ponds.

The Reduction-Oxidation and Plutonium-Uranium Extraction Plants produced uranium nitrate for recycle and plutonium nitrate for weapons component production. Uranium nitrate was shipped by tank truck to the Uranium-TriOxide Plant for processing. The Uranium-TriOxide Plant used specially designed machinery to heat the uranium nitrate solution and boil off the nitric acid, which was recovered and recycled to the separations plants. The product (uranium oxide) was packaged and shipped to other facilities in the United States for recycle. Plutonium nitrate, in small quantities for safety reasons, was placed into special shipping containers (P-R cans) and hauled by truck to Z Plant (later called the Plutonium Finishing Plant) for further processing.

The purpose of Plutonium Finishing Plant operations was to convert the plutonium nitrate into plutonium metal blanks (buttons) that were shipped off the site for manufacture into nuclear components. The conversion processes used nitric acid, hydrofluoric acid, carbon tetrachloride, and other organic compounds. Varying amounts of all these materials ended up in the intermediate-level liquid wastes that were discharged to cribs. Cooling water from the Plutonium Finishing Plant was discharged via open ditch to the 216-U-10 pond (U Pond). High-level solid wastes containing plutonium scraps were segregated and packaged for storage in special earth-covered trenches.

All of the former activities in the separations plants, the Reduction-Oxidation Plant, and the Plutonium Finishing Plant have been shut down and the facilities are in various stages of decontamination and decommissioning or alternate use. For example, the former T Plant complex now consists of two operational facilities used for waste sampling and verification, waste repackaging, equipment decontamination, and storage of a small amount of irradiated fuel from the former Shippingport, Pennsylvania reactor. See Section 2.3.4, "River Corridor Project," for additional information. Untreated low-level liquid wastes are no longer released to surface ponds, ditches, or cribs. These facilities are in various states of decommissioning, decontamination, and restoration. See Section 2.2, "Compliance Status" (especially Table 2.2.2), for details.

1.0.2.4 The 400 Area

In addition to research and development activities in the 300 Area, the Hanford Site has supported several test facilities. The largest is the Fast Flux Test Facility, located ~8 kilometers (5 miles) northwest of the 300 Area. This special nuclear reactor was designed to test various types of nuclear fuel. The facility operated for ~13 years and was shut down in 1993. The reactor was a unique design that used liquid metal sodium as the primary coolant. The heated liquid sodium was cooled with atmospheric air in heat exchangers. Spent fuel from the facility resides in the 400 Area, while other wastes were transported to the 200 Areas. With the exception of the spent fuel, no major amounts of radioactive waste were stored or disposed of at the Fast Flux Test Facility site. In January 1997, DOE made a decision to keep the Fast Flux Test Facility in standby while evaluating its potential for tritium and medical isotope production, as well as plutonium disposition. Tritium, a necessary ingredient in some nuclear weapons, decays relatively quickly so must be replenished. Medical isotopes are radioactive elements that are useful for the treatment of medical conditions such as cancer. Excess plutonium, no longer needed for national defense, could be disposed of by converting it to reactor fuel that could be burned in commercial reactors. Through the end of calendar year 1999, the future of the Fast Flux Test Facility was still undecided.

In spring 1999, the Nuclear Energy Research Advisory Committee (an independent advisor to the DOE) suggested to the DOE that more information was needed before a recommendation about continuing with the production of an environmental impact statement could be made. As a consequence, Pacific Northwest National Laboratory was asked by the Secretary of Energy in May to determine whether or not a compelling rationale existed for restarting the reactor. The results of the study were presented to the Nuclear Energy Research Advisory Committee in July and the committee recommended that the DOE proceed toward a record of decision on the test facility. In September, the DOE announced its decision to prepare an environmental impact statement to review the environmental effects associated with using the Fast Flux Test Facility to produce isotopes for medical use and plutonium-238 for space missions and nuclear research and development. A final impact statement is expected in October 2000. If the decision at that time is to initiate restart activities, it is expected that the reactor could be operational by January 2005. If a decision is made to shut down the facility, it is anticipated that deactivation would be complete by 2006. Details can be found in Section 2.3.5, "Fast Flux Test Facility."

1.0.3 Current Site Mission

For more than 40 years, Hanford Site facilities were dedicated primarily to the production of plutonium for national defense and to the management of the resulting wastes. In recent years, efforts at the site have focused on developing new waste treatment and disposal technologies and cleaning up contamination left over from historical operations.

The Hanford Site has two major missions: 1) environmental management and 2) science and technology. The environmental management mission includes the following:

- **management of waste** and the handling, storage, treatment, and disposal of radioactive, hazardous, mixed, or sanitary waste from past and current operations
- **stabilizing facilities** by transitioning them from an operating mode to a long-term surveillance and maintenance mode. This includes maintaining facilities in a safe and compliant status, deactivating primary systems to effectively reduce risks, providing for the safe storage of nuclear materials and reducing risks from hazardous materials and contamination. These activities are intended to allow the lowest surveillance and maintenance cost to be attained while awaiting determination of a facility's final disposition.
- **maintaining the Fast Flux Test Facility reactor** and its associated support facilities while alternative future missions for the reactor are explored (e.g., medical isotope production)
- **maintenance and cleanup** of several hundred inactive radioactive, hazardous, and mixed waste disposal sites; **remediation** of contaminated groundwater; and **surveillance, maintenance, and decommissioning** of inactive facilities.

The science and technology mission includes the following:

- **research and development** in energy, health, safety, environmental sciences, molecular sciences, environmental restoration, waste management, and national security
- **developing new technologies** for environmental restoration and waste management, including site characterization and assessment methods; waste minimization, treatment, and remediation technology.

DOE's goal is to clean up Hanford Site waste and ensure that its facilities are always in compliance with federal, state, and local environmental laws. In addition to its environmental management mission, DOE also supports other special initiatives to accomplish its national objectives.

The highest priority of the DOE's Hanford Site offices is to achieve daily excellence in protection of the worker and the public and in stewardship of the environment, both on and off the Hanford Site. By meeting the most rigorous standards, the DOE's Richland Operations Office and Office of River Protection provide safe and healthful workplaces and protect the environment across the Hanford Site. Fundamental to the attainment of this policy are personal commitment and accountability, mutual trust, open communication, continuous improvement, worker involvement, and full participation of all interested parties. Consistent with the strategic plan for the site (DOE/RL-96-92), both DOE offices on the site will reduce accidents, radiological and toxicological exposures, and regulatory noncompliances.

1.0.4 Site Management

The Hanford Site is managed by the DOE's Richland Operations Office and the Office of River Protection through the following contractors and subcontractors. Each contractor is responsible for safe, environmentally sound maintenance and management of its activities or facilities; for waste management; and for monitoring any potential effluents to ensure environmental compliance.

The principal contractors and their respective responsibilities include the following:

DOE Richland Operations Office. The DOE Richland Operations Office manages legacy cleanup, research, and other programs at the Hanford Site. Hanford supplied plutonium for the United States nuclear weapons defense for more than four decades, and is now engaged in the world's largest environmental cleanup project. Three cleanup outcomes are being pursued: restoring the Columbia River corridor, transitioning the central plateau for waste treatment and long-term storage, and putting DOE's assets to work solving regional and global environmental problems.

- **Fluor Hanford, Inc**. is the prime contractor for the nuclear legacy cleanup. Fluor Hanford, Inc.'s four principal subcontractors are Numatec Hanford Corporation, Waste Management Federal Services of Hanford, Inc., DynCorp Tri-Cities Services, Inc., and Protection Technology Hanford. As part of the commitment to the economic development of the Tri-Cities region, Fluor Hanford, Inc. and its major subcontractors established affiliate companies that are separate businesses with the flexibility to pursue and perform non-Hanford work.
  - Numatec Hanford Corporation - provides best-in-class engineering and project management services and technical expertise and implements relevant technologies to accelerate cleanup.
  - DynCorp Tri-Cities Services, Inc. - provides essential infrastructure services for the Hanford Site, including utilities, facility maintenance, real estate and site planning, emergency response, property management, fleet and transportation operations, and crane and rigging.
  - Protection Technology Hanford - provides management, operation, and integration of all safeguards and security services of the Hanford Site, except those of Pacific Northwest National Laboratory. These services include function design, testing and upgrade of safeguards and security systems, material control and accountability, physical security, personnel security, technical security, information security (classified and unclassified), vulnerability assessment, and the Hanford Patrol.

In addition, several affiliate (formerly enterprise) companies were created to provide services to Fluor Hanford, Inc. These subcontractors and their areas of responsibility include the following:

  - Fluor Federal Services, Inc. - provides project management, engineering, procurement, and construction services to government clients including the Energy, Defense, and State departments, as well as clients at the Hanford Site.
  - Lockheed Martin Services, Inc. - provides telecommunications and network engineering, Internet technology integration, software modernization, maintenance and support, engineering computational resources, data center management, imaging and document management, and multimedia services to other Lockheed Martin Corporation companies, government, and commercial industry.
  - Waste Management Technical Services, Inc. - role includes privatization of a select group of capabilities that were developed at Hanford. These transportation, engineering, environmental, and training services capabilities are unique, state-of-the-art, or simply acknowledged as being among the best available.
  - COGEMA Engineering Corporation - develops and designs waste sampling characterization and retrieval equipment, specialized analytical methods, and techniques. COGEMA Engineering Corporation applies its expertise in field screening and sampling to Hanford cleanup, as well as its special welding technique development and application.

- **Bechtel Hanford, Inc.**, the environmental restoration contractor, plans, manages, executes, and integrates a full range of activities for the cleanup of groundwater, contaminated soils, and inactive nuclear facilities. Bechtel Hanford, Inc.'s subcontractors are CH2M HILL Hanford, Inc. and Thermo Hanford, Inc.

- **Hanford Environmental Health Foundation**. Hanford Environmental Health Foundation's Health Risk Management program works with the site to identify and analyze the hazards that Hanford personnel face in the work environment. Hanford Environmental Health Foundation's occupational health services provide occupational medicine and nursing, medical surveillance, ergonomics assessment, exercise physiology, case management, psychology and counseling, fitness for duty evaluations, health education, infection control, immediate health care, industrial hygiene, and health, safety, and risk assessment.
- **Pacific Northwest National Laboratory**. Battelle operates the Pacific Northwest National Laboratory for DOE's national security and energy missions. The core mission is to deliver environmental science and technology in the service of the nation and humanity. Pacific Northwest National Laboratory services include molecular science research, advanced processing technology, biotechnology, global environmental change research, and energy technology development.

DOE-Office of River Protection. The Office of River Protection was established by Congress in 1998, as a DOE field office, to manage DOE's largest, most complex environmental cleanup project—Hanford tank waste retrieval, treatment, and disposal. Sixty percent of the nation's high-level radioactive waste is stored at Hanford in aging, deteriorating tanks. In late spring of 2000, the Office of River Protection conducted an expedited bidding process to complete the design and construction of a waste vitrification facility. The contract is scheduled to be awarded by January 2001.

- **MACTEC-ERS** is a prime contractor to the DOE Grand Junction Office and performs vadose zone characterization and monitoring work beneath single-shell underground waste storage tanks in the 200 Areas.
- **CH2M HILL Hanford Group, Inc**. is the Office of River Protection's prime contractor with responsibility for storing and retrieving for treatment ~204 million liters (54 million gallons) of highly radioactive and hazardous waste stored in 177 underground tanks. The company's role includes characterizing the waste and delivering it to the future waste vitrification facility.
- **BNFL, Inc**. was chosen by DOE to design, license, construct, and operate a vitrification facility to separate, treat, and immobilize radioactive liquid waste and sludges stored in the underground tanks at Hanford. Their contract with DOE was terminated in June 2000 and a replacement contractor is being sought.

1.0.5 References

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